



MCI® SOLUTIONS: PROTECTING THE FUTURE OF CONSTRUCTION

Innovative Corrosion Control
for Sustainable Infrastructure



CORTEC
CORPORATION

Environmentally Safe VpCI®/MCI® Technologies

FROM GREY TO GREEN
MCI
Migrating Corrosion Inhibitors



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Cortec® Corporation is a global leader in innovative, environmentally responsible VpCI® and MCI® corrosion control technologies. Established in 1977, our innovation is evident in the development of more than 400 products and the acquisition of more than 60 patents.

Cortec® has 40+ years of experience providing corrosion solutions to the construction industry under our MCI® (Migrating Corrosion Inhibitors™) brand, and more than 10 patents have been issued on our products used in this market segment.

Whether you are trying to maximize the service life of a new structure, extend the life of an existing structure, or find a solution for a specialty application, Cortec® has a corrosion solution to meet your needs.



Common-Sense Sustainability: We help structures last longer to reduce the overall need for carbon-intensive concrete.

Strategic Oversight: Vertically integrated manufacturing sites in North America and Europe allow us to “think locally, act globally.”

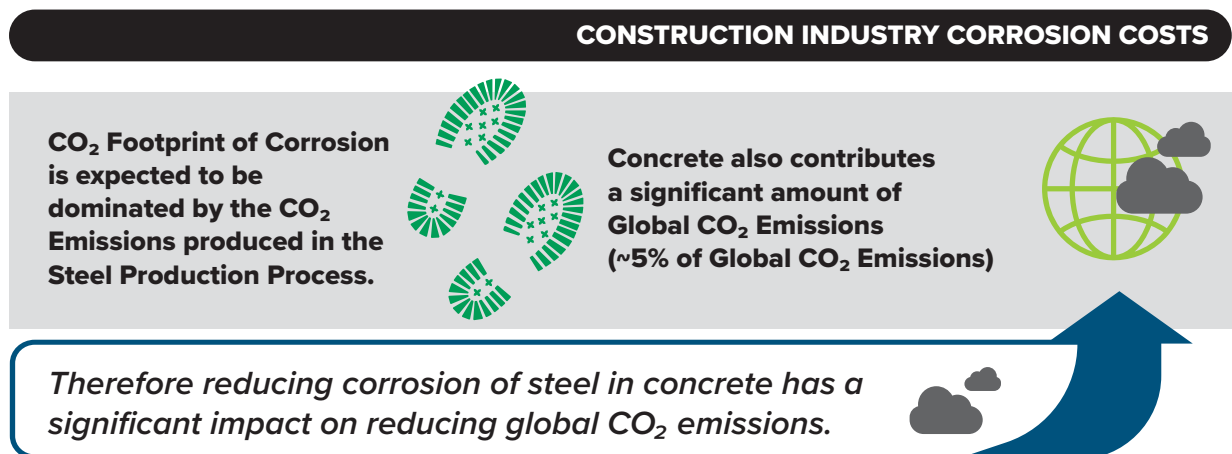
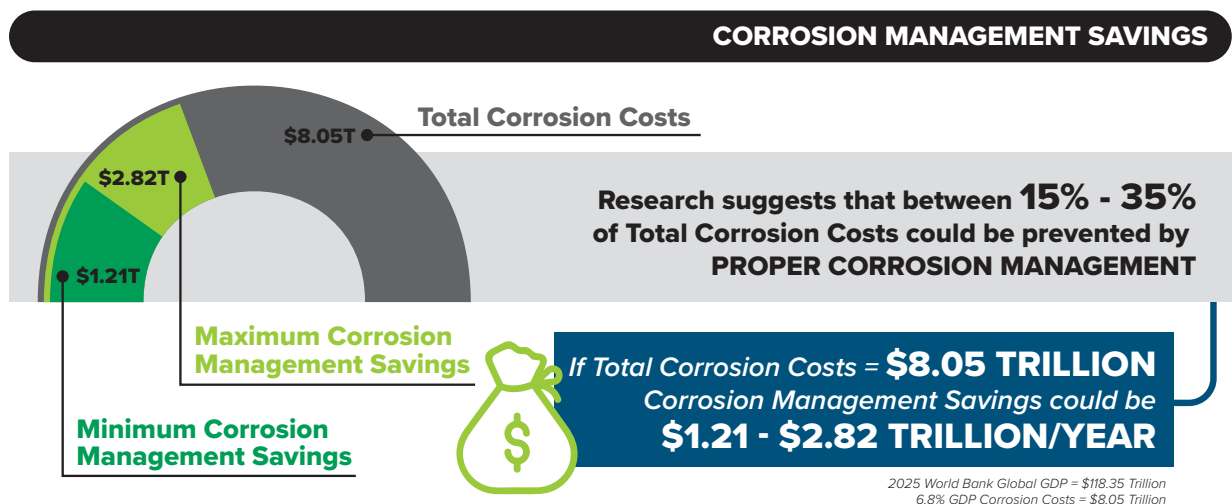
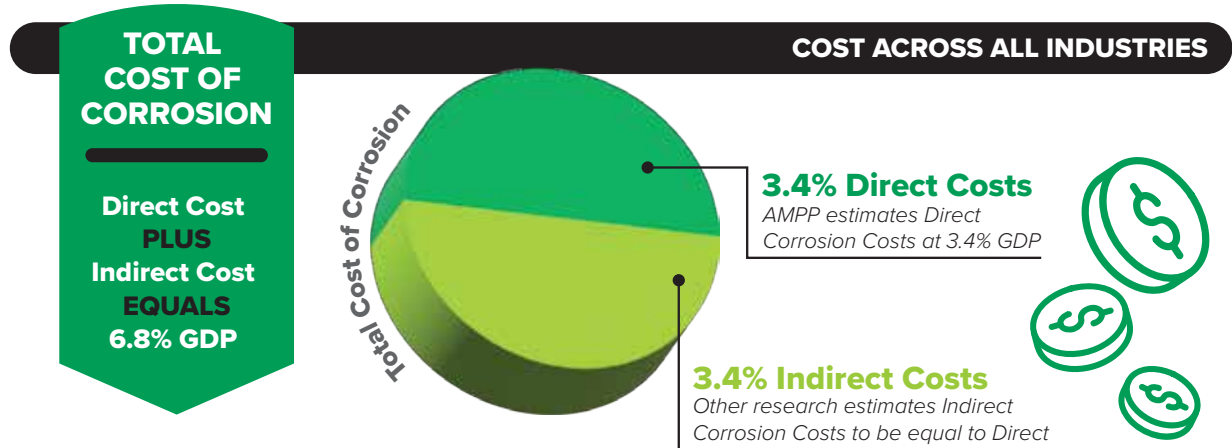


Innovative and Environmentally Responsible: Our most popular admixture contains 67% USDA certified biobased content.

COST OF CORROSION

Concrete itself is highly durable, making it a widely used construction material. However, reinforced concrete has limitations that can lead to damage and a shortened service life.

The most common culprit? Corrosion of embedded reinforcing steel.

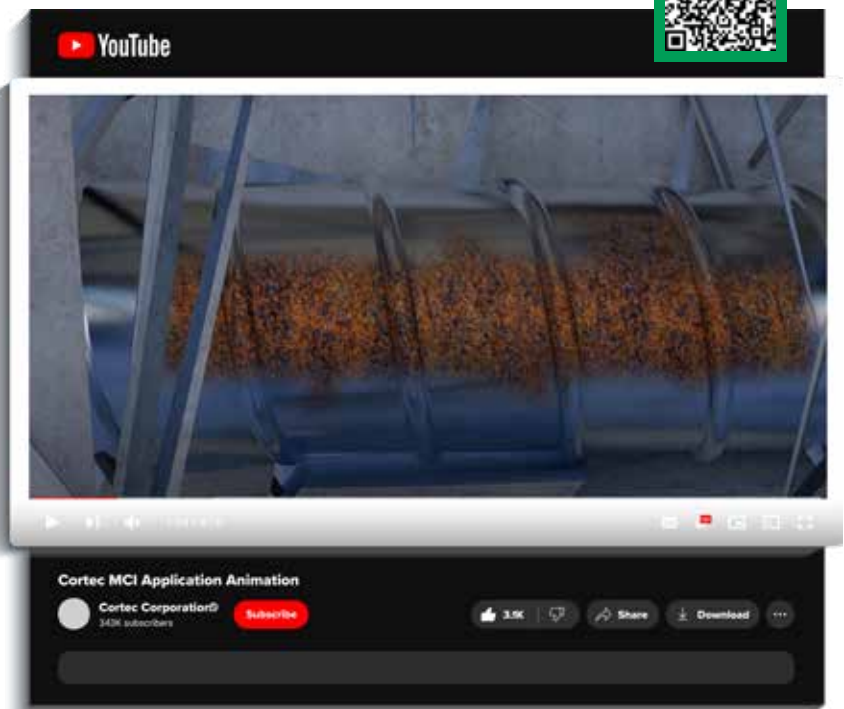


Sources: AMPP.com • Nature.com

HOW DOES CORROSION OCCUR IN CONCRETE?

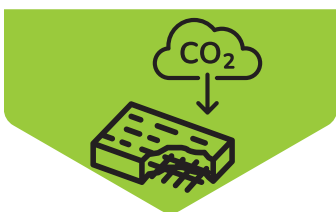
New concrete has a high alkalinity (~pH 13) which creates a passive oxide layer on embedded steel reinforcement. When the pH of concrete surrounding steel reinforcement drops below 12, the protective oxide layer is lost, and the corrosion process begins. Environmental factors can reduce the pH of the concrete and/or compromise the passive oxide layer on the steel, initiating corrosion.

Scan to watch the video!



CONCRETE CORROSION: CAUSES AND PROCESSES

New concrete protects steel reinforcement with high alkalinity (pH ~13). Corrosion begins when pH drops below 12, compromising this protection.



CARBONATION:

CO₂ reacts with concrete, lowering pH.



CHLORIDES:

Critical concentrations initiate corrosion even when pH remains high.



MICROBIOLOGICALLY INDUCED CORROSION (MIC):

Bacteria produce corrosive byproducts.



ENVIRONMENTAL POLLUTANTS:

Acid rain and sulfates attack concrete, reducing pH.

Cortec's arsenal of integrated corrosion solutions includes our line of products designed for use within the construction industry. Our patented MCI® (Migrating Corrosion Inhibitor™) technology is designed to protect embedded metallic reinforcement directly, providing effectiveness against many types of corrosion causes.

Admixtures:

Additives to ready-mix concrete, shotcrete, and pre-packaged cementitious based products.

Topical Treatments:

Available as pure inhibitors or water repellents applied to existing structures.

Repair Mortars:

Prepackaged mortars with MCI®, suitable for full-depth, vertical/overhead, and self-consolidating applications.

Specialty Products:

PT strand protection, rust removers and converters, cleaners/degreasers, temporary and permanent coatings, and more.



Hakalau Stream Bridge

Seismic Retrofit - Hamakua Coast, Hawaii

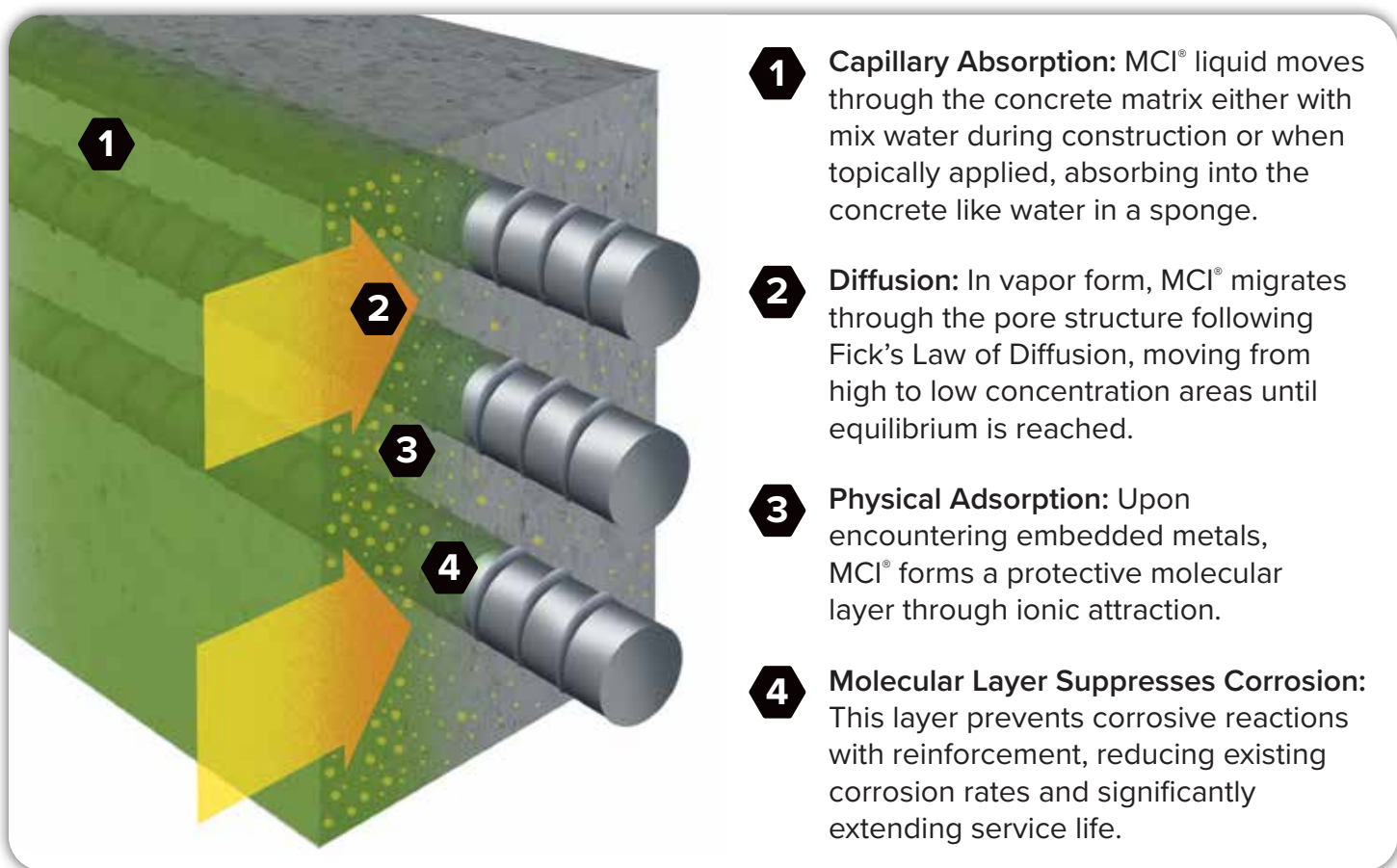
Case History 394

HOW DOES MCI® WORK?

Cortec's MCI® technology is designed to migrate to embedded reinforcing steel, forming a protective molecular layer on it. This protective layer delays the onset of corrosion, as well as significantly reducing corrosion rates after initiation.

MCI® materials are amine-based chemistries that are classified as mixed corrosion inhibitors, meaning they affect both anodic and cathodic portions of a corrosion cell.

MCI® moves through concrete and other porous substrates to adsorb on metal reinforcement.



Cortec® offers a range of corrosion inhibiting admixtures that meet industry standards.

MCI® benefits include:

- Meet ASTM C1582 & EN Requirements
- Technology recognized in ACI 212.3R
- Work independently of chlorides
- Protected even in cracked concrete
- Normal & delayed set versions available
- No detrimental effects to concrete properties
- Outperform competing materials
- Economical solution for concrete durability

Cost-Effective Service Life Extension

The Princess Tower in the United Arab Emirates used MCI®-2005 in the podium substructure, similar to the Burj Khalifa project. The addition of MCI® into the Princess Tower more than doubled the service life of the building at an investment of less than 1/10 of a percent of total construction costs.

ITEM	COST (USD)
Construction Cost	188,000,000
Construction Cost of MCI®-2005	136,000 (0.07%)
Service Life (Without MCI®)	48 years
Service Life (With MCI®)	103 years

An example of MCI® investment cost vs. service life extension for the Princess Tower



Princess Tower

Tallest Residential Building (2012-2014) - Dubai, UAE

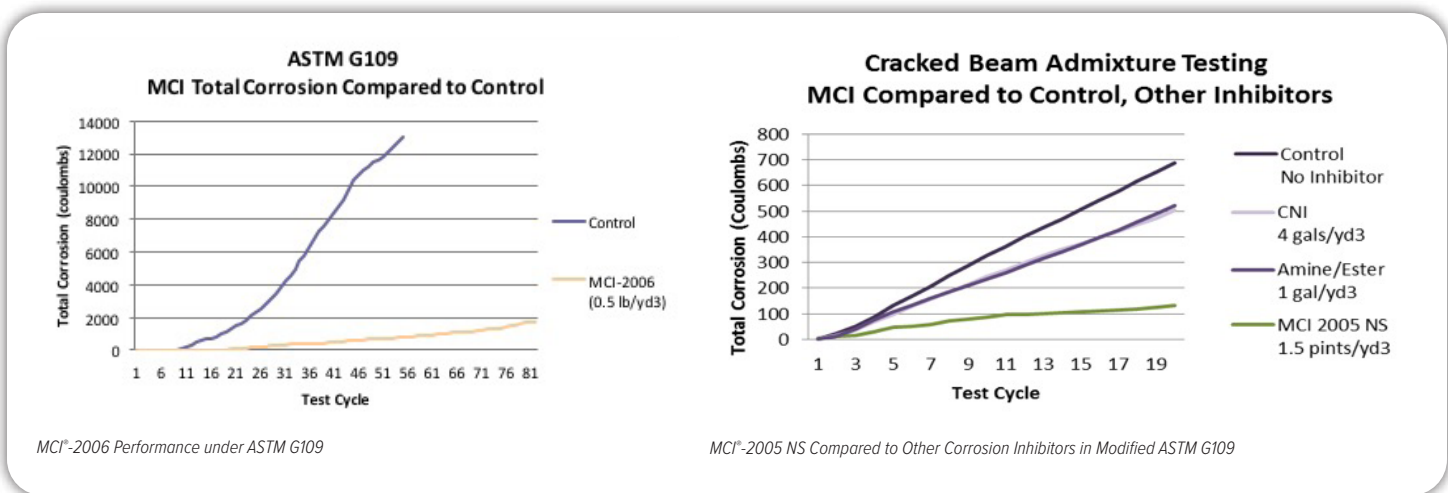
Case History 334

Independent Testing Results

MCI® admixtures have been tested according to many ASTM and European standards. MCI®-2005 NS and MCI®-2005 AL have been shown to meet ASTM C1582, including corrosion requirements under extended ASTM G109 testing. Treated samples did not even begin to show corrosion until approximately 20 cycles after the control began to corrode. In addition, MCI®-2005 NS admixture has shown superior corrosion protection compared to both CNI (calcium nitrite) and amine-ester admixtures when undergoing intense cycles of saltwater ponding on cracked concrete beams in modified ASTM G109 testing (cracked beam testing). MCI®-2005 passes ASTM C1582, including corrosion requirements under ASTM G180. It was also successfully tested according to EN934.

MCI®-2005 NS					
	Control	MCI®-2005 NS	Relative to Control	ASTM C1582 Requirements	Results
Average Integrated Current, C	155	29	n/a	≤50 C when control is 150 C	Meets requirements
Average Area Corroded, in ² (cm ²)	8.93 (57.61)	2.36 (15.23)	29%	≤1/3 of control	Meets requirements
Critical Chloride Content, ppm	2861	2898	101%	≥Critical control	Meets requirements

ASTM G109 Test Results for MCI®-2005 NS



MCI® admixtures not only reduced total corrosion to less than 20% compared to the control in ASTM G109 testing, but also did so at lower dosage rates than other corrosion inhibitor chemistries. Multiple MCI® admixtures have also shown very similar behaviors to the control in shrinkage testing. Furthermore, MCI® admixtures have shown significant protection against carbonation-induced corrosion and sulfate attack.

Feature	Cortec® MCI® Admixture	Calcium Nitrite	Amine Ester
Low environmental impact, derived from renewable resources, biobased	★	✗	✗
Used in small quantities—less than 1.5 pints/yd³ (1 liter/m³)	★	✗	✗
Dosed independent of chloride exposure	★	✗	★
Able to migrate through concrete in vapor phase at ambient temperatures	★	✗	✗
Does not increase shrinkage compared to a control	★	✗	★
Does not require adjustments to concrete mix design (chemical or water)	★	✗	✗
Does not accelerate concrete set time	★	✗	★
Has UL certification to meet ANSI/NSF Standard 61 (for drinking water system components)	★	✗	✗
Meets ASTM C1582 requirements and ACI's definition of a corrosion inhibitor	★	★	●
EN 1504 certified	★	✗	✗
Does not significantly affect concrete resistivity	★	✗	●
Compressive strength behavior	Similar to control	Initially more; long-term strength gain is less	Less than control

Comparison of Select Cortec® MCI® Admixtures to Other Inhibitors

★ True ✗ False ● Undetermined

TOTE SHIPPING & MANAGEMENT for 10,000 Yards of Concrete

CNI

Dosage Rate:
3 gallons per cubic yard



MCI®-2005 NS

Dosage Rate:
1.5 pints per cubic yard



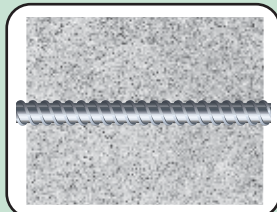
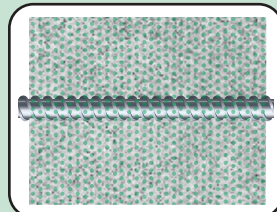
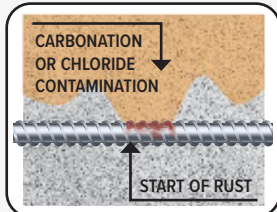
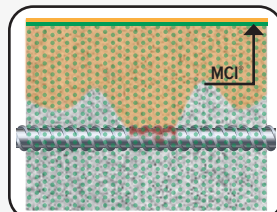
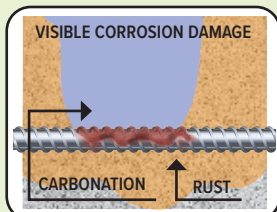
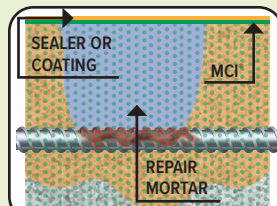
MCI®-2005

Dosage Rate:
1 pint per cubic yard



**109 TOTES VS.
6.8 TOTES OR 4.5 TOTES**

MCI® PRODUCT APPLICATION GUIDE

	Condition of Structure	Objective & Requirements	MCI® Product Recommendations	Features & Benefits
STAGE 1 New Construction	• New construction, environment exposed to corrosives or where codes demand additional protection in addition to good quality concrete construction. 	• Meet industry standards/building codes • Meet and extend designed service life • Competitive or reduced cost compared to alternatives • Compatible with mix design • Reducing carbon footprint	Multiple delivery methods to get Cortec® MCI® into a new construction project: • MCI®-2005/MCI®-2005 NS liquid admixtures – ideal for addition at a ready-mix producer using a dispensing system • MCI®-2006/MCI®-2006 NS powders – ideal for addition into shotcrete or pre-packaged repair materials • MCI® Grenades – ideal for onsite addition to concrete, shotcrete, or cementitious repair materials 	• Meet industry standards such as ASTM C1582 • Certified to meet ANSI/NSF 61 for drinking water system components • Low dosage rates (5-30x less than other corrosion inhibiting admixtures) • Little to no effect on mix properties (set time, strength, finishing, etc.) • Significant extension of service life (2-3x in many cases)
	STAGE 2 Existing Structures, No Visible Corrosion Damage	• Concrete structures without protective coatings • Aggressive environment • Initiation of corrosion • No spalling or cracking 	• Slow the rate of corrosion • Protect against possible concrete damage • Protect against further corrosion due to carbonation and/or chloride penetration	• MCI® Surface Applied Corrosion Inhibitors (SACI) are topically applied by spray, brush, or roller • MCI®-2020 Series materials are pure inhibitors in a water carrier • Can be followed with an application of a protective coating or repellent such as MCI®-2018, 2019, 2021, 2022, or MCI® Architectural Coating 
STAGE 3 Existing Structures, Visible Corrosion Damage		• Concrete surface with visible corrosion damage (i.e., spalling and cracking), repairs are necessary • High level of chlorides at depth of reinforcement 	• Repair of damaged surfaces • Long-term protection against future exposure of contaminants • Enhanced protection against the continuing damage of latent corrosion • Reduced risk of ring-anode (insipient anode) effect	• Clean exposed reinforcement with a Cortec® Cleaner such as VpCI®-422, 423, or 426 or removed loose rust and treat with MCI® CorrVerter • Application of MCI®-2039 or MCI®-2040 repair mortars • Application of MCI®-2020 to entire surface area • Application of Cortec® coating or sealer 

Relevant Case Histories

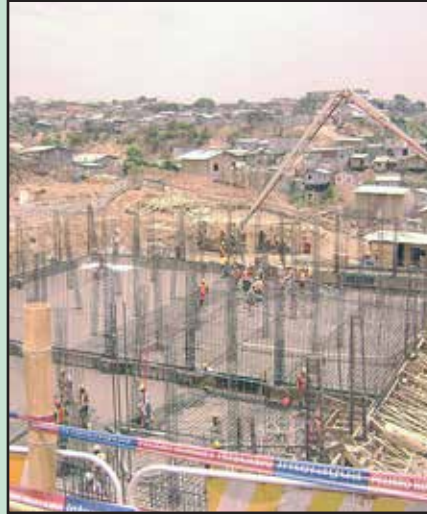
CONSTRUCTION OF NEW DRINKING WATER RESERVOIR

Guayaquil City, Ecuador • MCI®-2005 NS (371)

The construction of a new 4,500 m³ (5,886 yd³) drinking water reservoir had been proposed and the best protection was needed to extend the service life as long as possible.

Over 30,000 ft³ (850 m³) of concrete was treated with MCI®-2005 NS at 1.5 pints/yd³ (1 L/m³).

The UL NSF Standard 61 approval of MCI®-2005 NS solidified this project and will continue to be a selling point for future reservoirs.



See also:

Burj Khalifa Tower,
MCI®-2005 (310)

Wells Fargo Parking Garage,
MCI®-2005 NS (214)

Monteverde Gas Terminal
MCI®-2005 NS (427)

Punalu'u Stream Bridge,
MCI®-309 & MCI®-2005 NS (388)

Al Jalila Children's Specialty
Hospital, MCI®-2005 (473)

PENTAGON: RESTORATION OF ALL EXTERIOR WALLS

Washington, D.C., USA • MCI®-2020 V/O (046)

Corrosion of embedded reinforcing steel was causing spalling on the walls. Carbonation (up to 3.5 in [9 cm]) on the walls lowered the pH of the concrete causing the corrosion.

The requirements included: obtain minimum 20-year design life, stop water absorption, reduce or stop corrosion, and maintain the appearance of the walls. The repair program consisted of 200,000 ft² (18,580.6 m²) of surface hand patch repair and over 1,000,000 ft² (92,903 m²) treated with MCI®-2020 V/O and a silicate based coating.

MCI®-2020 V/O was chosen to protect and repair the walls based on its warranty and its fulfillment of the other specified repair design requirements.



See also:

Randolph Avenue Bridge
Restoration, MCI®-2000 (211)

Repair of Condo Balconies,
MCI®-2019 (253)

Parking Facilities Preservation,
MCI®-2019 W FD (425)

Pacific Tower Preservation,
MCI®-2020 (245)

RUNIB SWITCHYARD FOUNDATION REPAIR

Runib, Oman • MCI®-2020, MCI® CorrVerter®, MCI® Mini Grenades

Ingress of chlorides from the corrosive soil caused visible cracking, spalling, and delamination on the concrete foundations at the Petroleum Development of Oman (PDO) Runib Switchyard. The structures were over 20 years old, and recent repairs were already starting to fail.

Foundations were excavated and the spalled and delaminated concrete removed. MCI®-2020 was applied to all exposed concrete surfaces. CorrVerter® was applied to exposed and rusted rebar instead of using abrasive blasting. MCI® Mini Grenades were added to micro-concrete for shuttering and repair. The repair was cured and waterproofing applied. MCI® repairs have already lasted longer than previous repairs.



See also:

Emergency Stabilization of Alcatraz,
MCI®-2020, MCI® CorrVerter® (376)

Cooling Tower Repair, MCI®-2020,
MCI®-2038, MCI®-2039 (102)

China Railroad Bridge,
MCI®-2000, MCI®-2020,
MCI®-2021 (092)

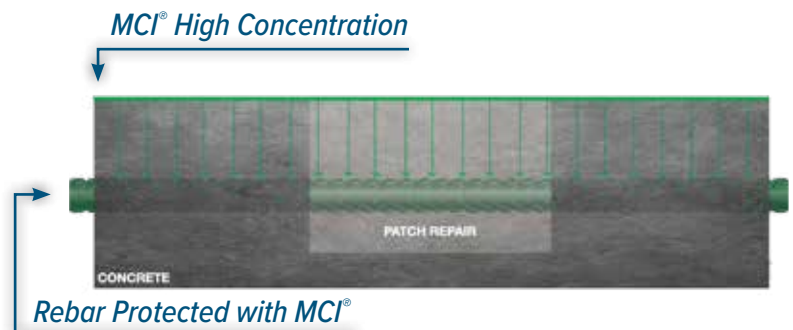
South Africa Brune Bridge Repair,
MCI®-2006 NS, MCI®-2020 (360)

Trinmar Offshore Platform Repair,
VpCI®-611, MCI®-2023, MCI®-2020, MCI®-
2039, MCI®-2021 (242)

TOPICAL TREATMENTS

MCI® solutions include a wide range of surface applied corrosion inhibitors (SACI), which are outlined in ICRI Guideline No. 510.2-109*. Pure corrosion inhibitors as well as water repellents containing MCI® are available to meet various project considerations.

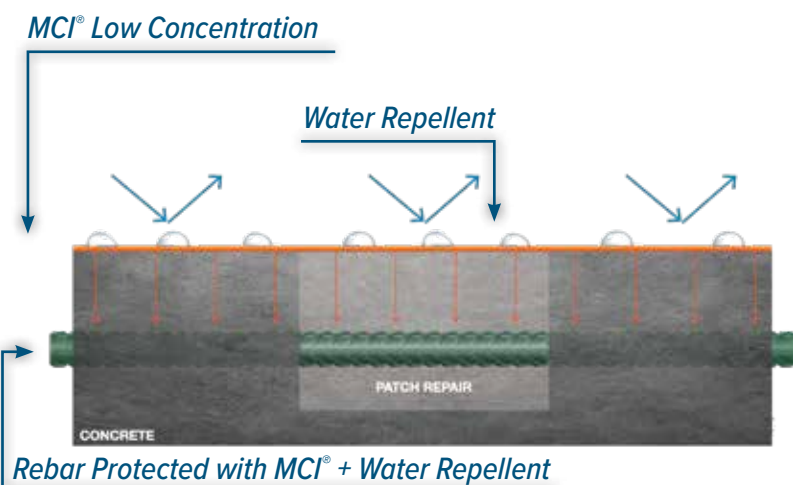
Pure (Neat) SACI: Highly concentrated products that are water-based. Our MCI®-2020 series of products are pure SACIs, providing the highest concentration of inhibitor in a single product application. They are ideal for an initial treatment of inhibitor into concrete and/or if corrosion levels are already elevated.



Water Repellent SACI: We have multiple water repellent formulast containing MCI available, including:

- Silane Based: MCI®-2018, 2018 V/O, 2019, 2019W
- Silane/Siloxane Based: MCI®-2022, 2022 V/O
- Silicate Based: MCI®-2021

These products provide a lower concentration of MCI® inhibitor (1/10th to 1/5th of what MCI®-2020 has), but have the additional benefit of repelling water, chlorides, and other contaminants from penetrating into concrete structures.

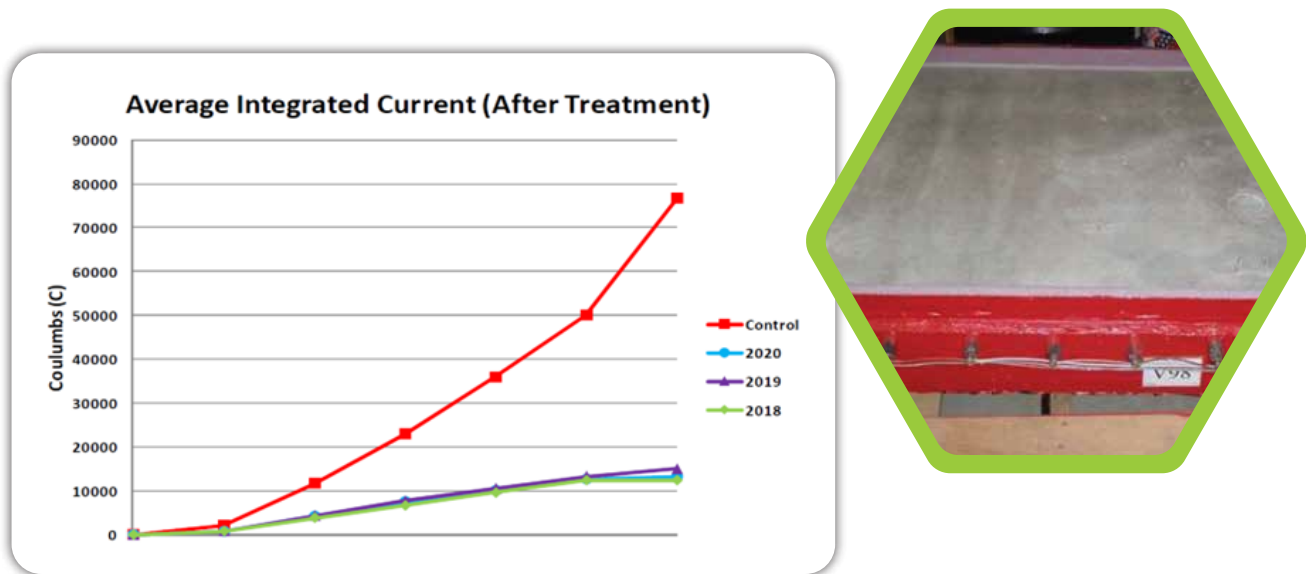


Topcoats such as architectural coatings and traffic deck membranes can be used over Cortec® MCI® SACI materials when following our recommended application guidelines.

MCI®-2018 and MCI®-2020 are certified to meet ANSI/NSF Standard 61 for drinking water system components. Both MCI®-2018 and MCI®-2021 have been certified by Applus to obtain CE marks for their specific chemistries.



Independent Testing Results: Several MCI® SACIs have been tested according to the U.S. Bureau of Reclamation M-82 Protocol. The MCI® materials were applied after test slabs reached 10,000 coulombs of corrosion. This criteria is used if the performance of the surface applied repair does not depend upon the amount of chloride present at the reinforcing bars, or if protection at a higher initial chloride content level is to be demonstrated. Test results confirmed that the SACI products were effective and reduced total average integrated current by five times.



Cortec® MCI® SACI products have been tested and proven to penetrate into concrete structures (note that prior applications of coatings, membranes, and repellents should be removed prior to application of an SACI).

The Efficacy of Using Migrating Corrosion Inhibitors (MCI®-2020 & MCI®-2020 M) for Reinforced Concrete

B. Bavarian, PhD., L. Reiner • March 2004

MCI®-2020 and MCI®-2020 M were analyzed for their ability to migrate, form a protective film, and mitigate corrosion on embedded reinforcement. Key findings were as follows:

- MCI® protected samples had an average current density of $0.4 \mu\text{A}/\text{cm}^2$ compared to $1.4 \mu\text{A}/\text{cm}^2$ for untreated samples, increasing the service life expectancy by more than 15-20 years.
- XPS depth profiling showed that MCI® inhibitors were able to adsorb deeper (nitrogen marker detected as deep as 85 nm for the MCI®-2020 M unetched sample and as deep as 75 nm for the MCI®-2020 unetched sample) than the chloride ions (60 nm), providing a protective film. Untreated samples had localized corrosion attack.

Mass Concentration %

Sample	Etch Time	Fe 2p	O 1s	C 1s	N 1s	Cl 2p	Ca 2p	Si 2p
Untreated	0	6.27	42.71	30.67	0.19	1.07	14.19	4.97
Untreated	120	13.60	39.43	23.08	0.14	1.06	17.59	5.19
Untreated	240	14.65	38.77	22.35	0.11	1.01	18.18	5.03
L2020	0	2.30	42.22	29.90	1.16	0.95	17.28	6.26
L2020	120	2.53	43.01	25.17	1.12	0.93	20.14	7.18
L2020	240	2.56	43.85	21.95	1.05	1.40	22.19	7.09
L2020M	0	2.02	40.20	38.55	1.32	0.87	11.54	5.53
L2020M	120	2.22	41.74	32.13	1.29	0.86	15.41	6.42
L2020M	240	2.82	43.61	28.99	1.15	0.83	15.92	6.68

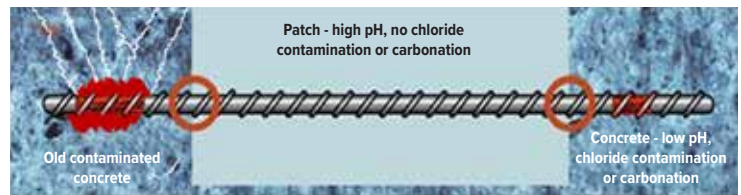
XPS analysis on concrete samples after 500 days, showing the changes in chemistry with etch time

REPAIR MORTARS

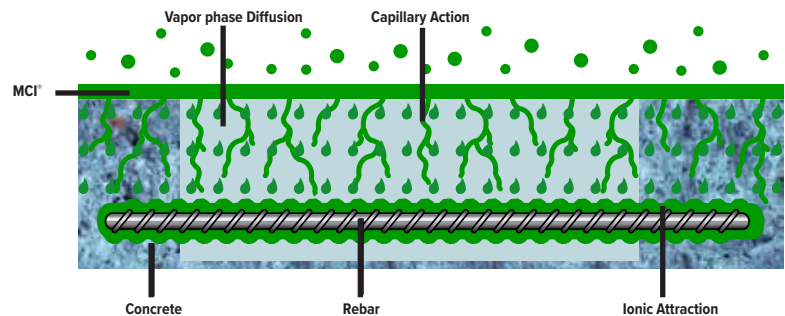
MCI® is important for ensuring the longest possible lifespan of concrete restoration projects. MCI® not only slows the rate of corrosion in deteriorating structures, but also protects against the troublesome ring anode/insipient anode effect that often follows concrete repairs. MCI® is ideal and convenient to add to concrete repair mixtures and migrates through adjacent areas after application to protect embedded reinforcement. MCI® is also available as a passivating grout for use on exposed rebar, or as a topical treatment to existing surfaces.



MCIs incorporated into repair mortars slow this process by working their way into adjacent concrete to form a protective molecular layer on embedded metal reinforcement outside the repair area. This evens out the corrosion potential between new and old concrete, thus reducing the ring-anode/halo effect and helping the repair last longer.



A common problem arising from concrete repair is the ring-anode/halo effect. This occurs because the repaired area tends to have a higher pH and resistivity, creating a difference in corrosion potential between new and old concrete. This causes corrosion activity to accelerate in the area in contact with the repair materials.



Incorporation of SACIs with MCI® repair mortars delivers corrosion inhibitor to areas untouched by the repair that may have corrosion but have yet to show visible damage, further extending the life of the structure.

Cortec's High Performance Repair System (HPRS®)

For the greatest impact on service life, follow Cortec's HPRS® steps below when doing concrete repair.



1

Prepare the Substrate

Chip out all loose, defected, and deteriorated concrete until a sound clean concrete substrate is achieved. Complete the surface preparation following ICRI Guideline No. 310.2R-2013 or another engineering guide.



2

Treat and Clean Rusted Rebars

Exposed reinforcement needs to be cleaned and prepared before applying repair materials. Rusted surfaces can be blasted to a bright metal to do this. Alternatively, loose rust can be removed with a wire brush, rinsed with water to remove debris, and followed with an application of MCI® CorrVerter® Rust Primer at a thickness of 3-5 mils (75-125 µm) DFT. MCI® CorrVerter® modifies any remaining surface rust into a hydrophobic passive layer and acts as a primer for the next step in the repair process.



3

Application of Repair Materials

Migrating Corrosion Inhibitors in repair materials protect steel reinforcement within and immediately adjacent to patched locations, reducing the ring-anode/insipient anode effect.

Application of repair materials should follow manufacturer and specification guidelines.

Horizontal Repairs: MCI®-2039

Vertical/Overhead Repairs: MCI®-2040

Form & Pour Repairs: MCI®-2044



4

Surface Applied Corrosion Inhibitor (SACI) Application

Pure SACI: MCI®-2020 series products can be applied to existing concrete (and cured repair areas) for enhanced corrosion protection in areas outside of patches. It can be followed by application of coatings or waterproofing membranes for enhanced protection against corrosion and contaminants.

Water Repellent SACI: MCI®-2018 series, MCI®-2019, or MCI®-2022 water repellents with MCI® added are dual purpose products that can protect embedded reinforcement with MCI® chemistry and repel water to prevent moisture and chloride intrusion; ideal when membranes or coatings are not used.



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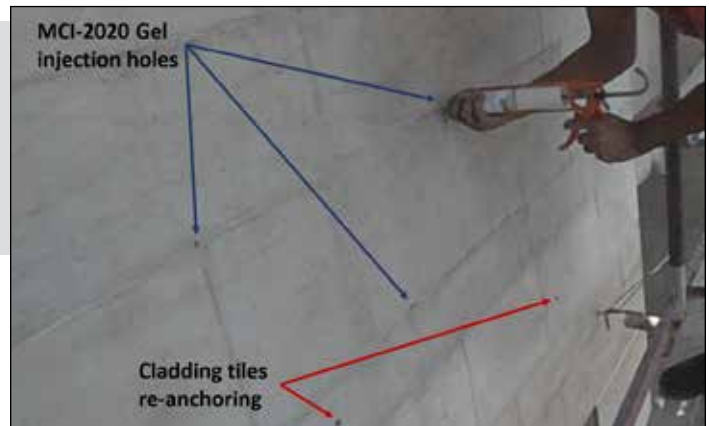
Final Coating

For added protection and a finished look, apply MCI® EcoRainbow® Architectural Coating over corrosion inhibitors. It prevents water intrusion and carbonation, and can be color-matched to project needs. Verify compatibility if using other coatings.

SPECIALTY PRODUCTS

Cortec® has a wide variety of specialty materials to provide corrosion protection in almost any situation.

MCI®-2020 Gel: Gel version of our MCI®-2020 SACI that can be used for protecting metals that are deeply embedded in concrete, and to bypass any cladding or paint that cannot be stripped or removed.



MCI® CorrVerter®: A water-based primer recommended for application on rusty or poorly prepared steel surfaces where corrosion protection is required and good surface preparation is difficult to achieve. CorrVerter® penetrates rust and passivates the steel to prevent further rusting.



MCI® CorShield®: Water-based coating for protection of exposed reinforcement. Cures to a soft, non-tacky film that provides up to 5 years of indoor protection or 6-24 months of unsheltered, outdoor protection.



MCI® Grenades: For 20 years and counting, Cortec's MCI® powder admixture has been available packaged in small water-soluble bags for ease of use and convenience. These can be added to mix water for concrete, repair mortars and other cementitious materials for enhanced corrosion protection.

MCI®-309: MCI®-309 powder can be applied in void spaces to provide up to 24 months of protection to prestressed cables before grouting. MCI®-309 does not have to be removed prior to grouting, thus eliminating extra steps.



St. Croix River Crossing



MCI® PTC Emitters: Powder corrosion inhibitor in a breathable package to release corrosion inhibitor into air systems protecting strands such as those on the Severn Bridge.

Concrete Cleaners/Degreasers: MCI®-2061 and MCI®-2062 are powerful cleaners that harness the activity of beneficial microorganisms to safely and effectively clean oil stains on concrete and other substrates. They can save time and money while providing deep cleaning action that does not erode the substrate.



Before & After Treatment with MCI®-2061

MCI® PRODUCT SELECTION GUIDE

	Type	Product		Description	Approx. Dosage Rate	Packaging
Admixtures	Amine Alcohol Based	MCI®-2000	◆	Liquid, amino alcohol based concrete admixture.	1 pt/yd³ (0.62 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums
	Amine Carboxylate Based	MCI®-2005	◆	Liquid, amine carboxylate based concrete admixture. Can retard concrete setting time 3-4 hours at 70 °F (21 °C).	1 pt/yd³ (0.6 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums 275 gal (1040 L) totes
		MCI®-2005 NS	◆	Liquid, normal set version of MCI®-2005. Cannot be frozen.	1.5 pts/yd³ (1 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums 275 gal (1040 L) totes
		MCI®-2005 AL	◆	Liquid, normal set version of MCI®-2005 with less ammonia odor.	1.5 pts/yd³ (1 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums 275 gal (1040 L) totes
		MCI®-2006	◆	Powder, amine carboxylate based concrete admixture. Can retard concrete setting time 3-4 hours at 70 °F (21 °C).	1 lb/yd³ (0.6 kg/m³)	5 lb (2.3 kg) boxes 50 lb (22.7 kg) 100 lb (45.4 kg) drums
		MCI®-2006 NS	◆	Powder, normal set version of MCI®-2006.	1 lb/yd³ (0.6 kg/m³)	5 lb (2.3 kg) boxes 50 lb (22.7 kg) 100 lb (45.4 kg) drums
		MCI® Grenades		MCI®-2006 NS powder pre-measured into water-soluble bags for admixing into concrete.	1 grenade/yd³	40 grenades/drum
		Metric MCI® Grenades		MCI®-2006 NS powder pre-measured into water-soluble bags for admixing into concrete.	1 grenade/m³	32 grenades/drum
	Specialty	MCI®-2007 Super Corr™	◆	Liquid, melamine based superplasticizer with MCI®.	3-4 pts/yd³ (1.5-2 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2012		Concrete waterproofing admixture that is enhanced with MCI® for added corrosion protection.	1.7 quarts/yd³ (2.1 L/m³)	5 gal (19 L) pails 55 gal (208 L) drums 275 gal (1040 L) totes
Surface Treatment	Water Repellents with MCI®	MCI®-2018 Series		100% solids silane water repellent, with or without MCI®. Vertical/overhead versions available. Spray, brush, or roller applied.	125-175 ft²/gal (3-4.2 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2019 Series		40% solids silane water repellent, with or without MCI®. Solvent-based (VOC compliant) and water-based versions available. Spray, brush, or roller applied.	125-175 ft²/gal (3-4.2 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2021	◆	Water-based, silicate densifier containing MCI®. Spray, brush, or roller applied.	150-250 ft²/gal (3.7-6.1 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2022 Series	◆	Water-based, silane/siloxane blend water repellent containing MCI®. Spray, brush, or roller applied. V/O version for vertical and overhead applications.	125-175 ft²/gal (3-4.2 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI® POWR 100		100% silane-based, penetrating oil and water repellent containing MCI®. Spray, brush, or roller applied.	125-175 ft²/gal (3-4.2 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
	Amine Carboxylate Based	MCI®-2020 Series		Clear, penetrating surface treatment for existing structures. Contains Migrating Corrosion Inhibitors that form a protective film on embedded metals. Certified to meet ANSI/NSF Std. 61 for drinking water system components. V/O version for vertical and overhead applications.	150 ft²/gal (3.68 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2020 M SC		Modified, concentrated version of MCI®-2020 designed for dilution (one drum makes two drums of ready to use material).	150 ft²/gal (3.68 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums
	Coatings	MCI®-2026 Primer WB		Two-component, chemically resistant, water-based epoxy primer for concrete.	180-250 ft²/gal (4.4-6.1 m²/L)	2.5 gallon (8.5 L) and 25 gallon (85 L) kits
		MCI®-2026 Floor Coating		Two-component, chemically resistant, 100% solids novolac epoxy for concrete. Excellent chemical and abrasion resistance.	125-150 ft²/gal (3.0-3.7 m²/L)	2.5 gallon (9.5 L) and 12.5 gallon (47 L) kits
		MCI® EcoRainbow® Architectural Coating		Clear, water-based, acrylic primer/topcoat containing MCI®. Also available in white, grey, and custom colors.	535-641 ft²/gal (13-16 m²/L)	5 gal (19 L) pails 55 gal (208 L) drums

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	Type	Product	Description	Approx. Dosage Rate	Packaging
Specialty Products	Steel Coatings/ Release Agents and Temporary Protection	MCI® Coating for Rebar	Water-based, tacky barrier coating that provides extended outdoor protection for exposed steel and aluminum.	300 ft ² /gal (7.3 m ² /L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI® CorShield®	Water-based rebar coating for superior protection during storage and when in service as embedded reinforcement.	300 ft ² /gal (7.3 m ² /L)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI® Peel-Off Coating	Temporary, removable coating containing MCI® for protection against knicks, abrasion, scratches, etc.	140-160 ft ² /gal @ 4 mils (13-15 m ² /L @ 100 microns)	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2050	Form/mold release agent containing MCI® Technology. Forms a thin protective film to which concrete, asphalt, dirt, or other debris will not stick.	Rates vary dependent upon substrate and desired results; ≈125-150 ft ² /gal (3.0-3.7 m ² /L)	5 gal (19 L) pails 55 gal (208 L) drums Liquid totes Bulk
		MCI® Construction Film	A polyethylene film designed for use in the construction industry. Inhibits corrosion on both ferrous and non-ferrous metals.	N/A	20' x 100' sheeting, 4 mil (6.1 m x 30.48 m, 100 microns)
	Post-Tensioning and Cables Protection	MCI®-309	A corrosion inhibiting powder for protection of ferrous metals in recessed areas, interior cavities, and voids.	0.3-0.5 oz/ft ² (300-500 g/m ²)	5 lb (2.3 kg) boxes 50 lb (23 kg) drums 100 lb (45 kg) drums
		MCI® PTC Emitters	Breathable pouches filled with MCI® powder for corrosion protection of post-tensioned cables and other metallic components in recessed areas, interior cavities, and voids.	1 pouch protects 35 ft ³ (1 m ³)	Carton of 50 pouches
	Injectable Gels	MCI®-2020 Gel	MCI®-2020 in gel format for injection into existing structures.	Based on hole diameter and depth	13 oz (384 mL) tubes 5 gal (19 L) pails 55 gal (208 L) drums
	Rust Remediation	VpCI®-422 VpCI®-423 VpCI®-426	Water-based rust removers. Removes rust stains from concrete. Also available in gel form. Rinse concrete with MCI®-2060 after application to neutralize.	200-600 ft ² /gal (5-15 m ² /L)	5 gal (19 L) pails 55 gal (208 L) drums Liquid totes Bulk
		MCI® CorrVerter®	Water-based primer for rusted or poorly prepared surfaces. Does NOT contain tannic or phosphoric acid.	134-224 ft ² /gal (3.3-2.5 m ² /L)	1 gal (3.8 L) pails 5 gal (19 L) pails
	Cleaners/ Oil Removers	MCI®-2060	Cleaner and degreaser that contains MCI®. Effectively cleans caked on grease, dirt, oil, and mud off concrete.	May be used as is or diluted up to 1%	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2061	Cleaner and degreaser for hydrocarbon based oils. Contains microorganisms that break down crude oil, gasoline, diesel, and other petroleum based materials.	Concentrated, heavily soiled surfaces: dilute 1:10 with water; lightly soiled surfaces: dilute 1:40 with water	5 gal (19 L) pails 55 gal (208 L) drums
		MCI®-2062	Cleaner and degreaser for organic soils and wastes. Contains microorganisms that break down organic material including vegetable oils, fat, starch, proteins, and other organic waste.	Dilute 1:9 with water before use; coverage depends on substrate thickness, porosity, and permeability	5 gal (19 L) pails 55 gal (208 L) drums
		EcoLine® 4320/4330	Heavy-duty paint strippers that remove coatings, inks, and resins from metals, concrete, and wood surfaces. Contain 50% USDA certified biobased content. EcoLine® 4330 is gel form.	200-800 ft ² /gal (5-20 m ² /L)	5 gal (19 L) pails 55 gal (208 L) drums Liquid totes Bulk
Repair Products		MCI® Mini Grenades	MCI®-2006 NS powder pre-measured into water-soluble, PVA bags. Allows you to add corrosion inhibitor to any bagged mortar or grout mix.	1 per 0.5-0.6 ft ³ (1 per 0.015 m ³)	100 grenades/carton
		MCI®-2039	Single component, horizontal repair mortar with MCI® Technology.	Approx. 0.42 ft ³ (0.013 m ³) yield per bag	50 lb (22.7 kg) bag
		MCI®-2040	Single component, vertical/overhead repair mortar with MCI® Technology.	Approx. 0.46 ft ³ (0.013 m ³) yield per bag	40 lb (18.1 kg) bag
		MCI®-2044	Self consolidating concrete mix with MCI® Technology.	Approx. 0.45 ft ³ (0.01 m ³) yield per bag	50 lb (22.7 kg) bag

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Pelješac Bridge
Cable-Stayed - Dubrovnik, Croatia
Case History 746



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Cortec® Corporation is the global leader in innovative, environmentally responsible VpCI® and MCI® corrosion control technologies for Packaging, Metalworking, Construction, Electronics, Water Treatment, Oil & Gas, and other industries. Cortec® manufactures over 400 products distributed worldwide.

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